

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 121400, CST 7:05p 57/1

PAO The commander, Frank Borman, is in his 7 hour sleep period now. He should be about 1 hour along. Following that we will have sleep periods for command module pilot, Jim Lovell, and for lunar module pilot, Bill Anders. Most of the tasks throughout the night, at least night here in Houston will be housekeeping chores. There will also be eat period for the command module pilot and lunar module pilot before they begin their sleep period. And they will be doing some navigation exercises onboard. And primarily monitoring systems and doing housekeeping chores aboard the spacecraft. At 12 hours 15 minutes into the flight, this is Apollo Control.

END OF TAPE

PAO This is Apollo Control Houston at
12 hours 45 minutes into the flight. At the present time,
Apollo 8 is just beyond 60,000 miles from the Earth,
60,536 nautical miles and the spacecraft velocity is con-
tinuing to decrease gradually. At the present time, the
speed is about 7,500 feet per second. During the past
30 minutes, we recorded about 5 minutes of conversation
with the spacecraft. We'll play that back for you now.

CAP COM Apollo 8, Houston. Voice check.

SC Read you fine, Houston.

CAP COM Apollo 8, Houston.

SC Roger, Houston. Read you loud and clear

CAP COM Okay, loud and clear. We're back up
with you, completed our second test. Okay?

SC (Garble)

CAP COM Okay, our next test will be a test of
the uplink voice and ranging with downlink voice and
ranging on low bit rate, so we'll be changing bit rate on
you and we'll be making a voice check in the middle.

SC Okay. You probably had it on the high
gain - you might try to get it in but it's going to hit the
skin level at any second.

CAP COM Okay, Apollo 8. We'll try to get all
our information before we lose the high gain.

SC Okay, we'll just leave it go.

CAP COM Roger.

SC We're at the scan limit. We'll let it
go, Houston.

CAP COM Okay, Apollo 8. Go ahead and switch
to the omni.

SC Are you through with your test?

CAP COM Okay, we've got 3 steps of the test.
We'll have to pick up the rest next time we get a look at
high gain.

SC Okay.

SC Houston, Apollo 8.

CAP COM Go ahead, Apollo 8.

SC Roger. Reading on P-21 at 269 10 indi-
cates a parallel of about 67.4 miles. I guess we can carry
her.

CAP COM You guys are getting pretty good.

SC That's a lot better than our first
answer.

CAP COM We don't care if we're right, just so
your is right.

SC Houston, Apollo 8.

CAP COM Go ahead, Apollo 8.

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 12:45, CST 7:35P 58/2

SC Roger. I'd like to ask a question about this TLI plus 11 maneuver that we copied. In the remarks, you have P-37, delta V 7900. Is this the delta V that we would use with P-37.

CAP COM Let's see, that's the option that you used with minimum time.

SC Roger. What I'd like to do is check on our P-37 with your TLI maneuver update.

CAP COM Okay, Apollo 8. We'd like to make sure that we don't have a misunderstanding with the 7900 feet per second is the delta V. It's not associated with the high speed work around procedure - it's just the standard P-37 delta v.

SC Roger. But was that the delta v that you used to give us the TLI plus 11 - okay, I see, you win.

CAP COM Apollo 8, that's not the one that the maneuver pad was based on. That's the number you put in for the minimum time.

SC Roger. Understand.

CAP COM Okay. Sounds like a good idea if you want to go ahead and check out the 37. We're standing by to work on COM as soon as that high gain is available.

SC Roger.

SC Okay, Houston, you got . . .

SC Houston, do you read? Apollo 8, over.

CAP COM Apollo 8, Houston.

SC Roger. High gain yours.

CAP COM Okay. And if you're ready, we are. We'll go right ahead with our COM test.

SC Go ahead.

CAP COM We're starting in now on our fourth test. Like for you to put your telemetry input switch to PCM high.

SC Carry on.

CAP COM Okay, and now we're going to switch, I think, to the upvoice backup for about 2 minutes and it may take a couple of seconds when you get up here where it's lost. So, you can place your up telemetry switch to upvoice backup and if all of this doesn't work out too well, I'm reading 1247 on my clock now and let's meet back in our present configuration no later than 1250.

SC Roger, on upvoice backup.

CAP COM I'll be right back.

CAP COM Apollo 8, Houston.

SC Roger, Houston, read you loud and clear.

CAP COM Okay. That's pretty good. That's up-voice backup and will you confirm again the narrow beam on high gain?

SC Roger. Copy.

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 12:45, CST 7:35P, 58/3

CAP COM Okay. Thank you. We've got to continue with tracking and watching high gain antenna for a couple of minutes. Then, I'll give you a call when we're ready to go back.

SC Roger.

CAP COM Apollo 8, Houston. We have completed this test. We'll be switching back to full up link. When you hear the noise associated with the loss of modulation, you can go back from the up-telemetry switch to data.

SC Okay. Apollo 8.

CAP COM Okay, loud and clear.

SC How's everything looking down there?

CAP COM Real fine. We've just got one to go if you'll put your telemetry input PCM switch to LOW.

SC Roger. Go in LOW.

CAP COM Okay, that will be your next configuration for about 2 minutes and then we'll be completed with the COM test.

SC Roger.

CAP COM I have some service module RCS quantities if you would like to take them sometime and check them against your onboard tabulations.

END OF TAPE

PAO This is Apollo Control at 13 hours 16 minutes into the flight. We are in communication now with the spacecraft. And we have some accumulated tapes of previous conversation during the past 30 minutes. We will play back the tape first and then pick up with whatever conversation is going on when we finish.

SC Roger. Ready to copy. Could you give quad A, B, C, and D in that order?

CAP COM Okay, will do. And I give you weights and pounds and percentages. Quad A 231 for 76 percent.

SC Roger. Stand by. What time is that for?

CAP COM Oh, 12:15.

SC Okay, go ahead.

CAP COM Okay, quad Bravo 251, 82 percent. Quad Charlie 240, 79 percent.

SC - Slow down.

CAP COM Quad Delta 245, 81 percent. P and C advises that these numbers are still good, even though it is a 12:15 time. And we are completed with the com test. You can take your high-gain antenna and go back to medium.

SC Roger. Medium.

CAP COM Apollo 8. We would like to dump your tape again. If you are not using it. And the reason we want to do this is we had some - we didn't completely get dumped before the burn. We would like to get that and get the rest of the burn data. There is no hurry on it. We can do it whenever it is convenient for you.

SC You got it.

CAP COM Okay, thank you. Apollo 8. Houston. Do you call?

SC Negative - negative. Negative, Houston.

CAP COM Okay, thank you. Say. We're curious. What did you do about your May West?

SC We thought we might bleed the CO2 down into the vacuum connector here in our next water dump. We forgot it last time. Did you copy?

CAP COM Roger. Doesn't seem like there is any problem with going ahead and dumping it in the cockpit if you like.

SC It is CO2, isn't it?

CAP COM That's fine. Apollo 8. Houston. We asked it again, and it looks like no problems at all with going ahead and blowing it down in the cockpit. And then if you need it again on entry or after entry, well, we can blow it up with oral tube.

SC Roger. Understand.

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 131600, CST 8:05p 59/2

CAP COM Apollo 8. Houston. Apollo 8. Houston.
Apollo 8. Houston. Apollo 8. Houston.

SC Houston. Apollo 8. Read you loud and
clear. How us?

CAP COM Okay, loud and clear. Didn't get you
there for a while.

SC We have been reading you all along,
Houston.

CAP COM Roger. Did you attempt to transmit or
were you just not getting through?

SC Roger, we attempted to transmit and it
sounded like you had a stuck mike there for a little while.

CAP COM Okay, that shouldn't make any difference
to us on that duplex mode. Okay, what I was calling for
Apollo 8, we have got a maneuver path that is TLI plus 25.
I would like to read up to you when you are ready for it.

SC Go ahead, Houston. TLI plus 25.

CAP COM Okay, TLI plus 25 and this will be in
SPS G&N. 63087 minus 162 plus 129 027 56 29 64 minus 001
63 plus 00001 plus 527 59 177 137 001 November Alpha plus
00201 527 59 623 525 43 14 2347 337 023 up 195 left 17
plus 11 45 minus 165 00 127 80 358 90 074 3816 North Star
068 097 356 no ullage. For the fast return P37 Delta V,
79 00 to the Indian Ocean. High speed procedures are not
required. Over.

SC Houston. Apollo 8. Maneuver path

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 132600, CST 8:15 60/1

SC Houston, Apollo 8. Maneuver plan as follows,
how do you read, over?

CAPCOM Loud and clear.

SC Roger, TLI plus 25, SPS, G&N 63087 minus 162
plus 129, 027 56 2964 minus 00163 plus 00001 plus 52759 177
137 001, not applicable, plus 00201 52759 623 52543 14 2347
337 023 up 195 left 1.7 plus 1145 minus 16500 12780 35890
074 38 16. North set 068 097 356 DELTA-H P37 past return of
7 - 700 and 7900 DELTA-V Indian Ocean high speed not required.

CAPCOM That's correct Apollo 8. And we'll have
a couple more things for you before too long. We're working
on a flyby pad at this time. And we're going to be talking
some more to you about the problems of looking at stars in
the sextant and telescope. And what we'd like to do as soon
as the block team comes on the mock, while we have two teams
here, we like to get a rehash from you on exactly what you see
and what you don't see under what conditions. And see if we
can define it so that everyone here understands what you've
been telling us. And if you have any comments concerning the
timeline knowing that we got off our timeline before the burn.
If you have any comments about that method of getting back on
schedule, we'd like to hear those too.

SC Roger, we have one request. CDR would like
to get clearance to take a Second.

CAPCOM Okay, Apollo that a Go.

SC Roger, And Houston this is 8, we might
go over our future map siting schedule if it's going to be
revised at all.

CAPCOM Okay, Apollo 8, no plan revisions.

SC Roger.

CAPCOM Apollo 8, Houston.

SC Go ahead, Houston.

CAPCOM Okay, have your flyby pad now so I can
give that to you whenever you're ready for it.

SC Stand by. Ready to copy.

CAPCOM Okay, Apollo 8, may we go on a flyby
maneuver pad. This will be an SPS G&N 63087 minus 162 plus 129
060 59 4804 plus 009 62 plus 005 68 minus 020 77 000 000 000
November-Alpha plus 00202 02359 022 02282 03 0399 314 013
up 048 right 37 plus 1418 minus 16500 129 04 361 60 146 2911
North stars 323 090 056 no ullage. Remarch number one this
requires realignment to preferred reset reference. Two this will
raise the parallel to 5 50 nautical miles, over.

SC Roger, read back.

CAPCOM Go ahead.

SC Flyby SPS G&N 63087 minus 162 plus 129
060 59 4804 plus 009 62 plus 00568 minus 02077 000 000 000
NA. Are you with me so far.

APOLLO 8 MISSION COMMENTARY 12/21/68, GET 132600, CST 8:15 60/2

CAPCOM Keep going.
SC Plus 00202 02359 022 02282 03 0399 314
013 up 048 right 37 plus 1418 minus 16500 129 04 361 60 146
2911 North 323 090 056 no ullage. Realign for preferred
ref set. At perigee is 50.
CAPCOM That's a parallel to 5 50.
SC Understand 550.
CAPCOM Firm and that parallel.
SC Roger.
CAPCOM Apollo 8, Houston.
SC Go ahead Houston.
CAPCOM Okay, we've completed the dump and the
tape recorder is yours and we listened to the call data voice
playback and you've been given a go for your first test in
creative writing.
SC Roger, are we in low bit rate now?
CAPCOM That's negative, you're in high bit and
you understand that it's your tape recorder.
SC Roger, are we going to stay in high bit
all along or we going to get back to low here soon, not that
it matters much to us really.
CAPCOM Okay, we plan to stay in high bit rate
we're going to ask you if it made any difference and you read
our minds. That's pretty good for 63 K.
SC Roger. That's an altitude record for
mind reading. Houston, Apollo 8.
CAPCOM Go ahead Apollo 8.
SC Roger, onboard calculations indicate that
at 18 hours 30 minutes GET we are now 64 200 miles above the
Earth. That's using alternate slide rule.
CAPCOM We've got 63 855.
SC Houston, this is Apollo 8. We're going
to try to keep the conversation down here for awhile so the
CDR can go to sleep.
CAPCOM Okay, we would like to get some comments
from you before you sign off concerning the telescope, sextant
and verification that you have done something with the seal 2
in your May West and comment on the window status.

END OF TAPE

CAP COM ... some comments from you before you sign off concerning the telescope sextant and verification that you have done something with the CO2 in your May West. And comment on when the status.

SC Roger. Is it a requirement that we do something with the CO2 at this time? Over.

CAP COM No, I would it ...

SC Roger. We have maintained the same condition. We have left it as it was. And we will take care of it later.

CAP COM Okay.

SC Let me at this time go over the comments about the navigation as I see it so far.

CAP COM Go.

SC In the beginning, the operation with the S-IVB precluded immediate starting up of our sighting as scheduled since we had another evasive maneuver. The dumping of the S-IVB caused a tremendous amount of - of psuedo stars in the area which made a objects calibration practically impossible. The measures which we had worked out did not seem to work too well. The method which I finally used was to go into P23, go to Sirius, which was our brightest star get the shaft in trunion and then fly the spacecraft up to Sirius. To use that for objects now, which we did at a later time. With regards to light scatter, it appears that at almost any attitude during our passive thermal control we are receiving light scattering in the scanning telescope. It takes the form mostly of a wide band of light right across the center of the scope about 10 degrees either direction of zero. It is very difficult to see stars in this area. The realignments have been good. I have been able to pick up the star in the sextant to do the alignment, but I was not able to identify the star which we used in such cases as Regor or Menkent in the scanning telescope. The first star sighting, which I took of the earth showed a very indistinct horizon. But there did appear to be very - or somewhat sharp line between what appeared to be the earth's horizon and the atmosphere. The landmark line-of-sight filter appeared to help out this horizon definition. There is a very hazy and indistinct horizon through, between the space and the top of the atmosphere itself. And this is a very difficult one to use. As I said before, at times, looking at the moon with the sun in the near vicinity, the area around the moon, the space around the moon is not dark, but it light - appears as a light blue. And this is also the same case in looking into the sextant during alignments with the star -

SC with the sun in somewhat vicinity of the object. However, I have no difficulty in finding these stars in the sextant. I also had no difficulty in spotting the stars I used such as Sirius, Procyon or Canopus against the earth during our star-horizon measurements. I can see all three of those stars against the earth background. I believe it will be very difficult to do a backup GDC alignment using the north set stars, since Navi is not too bright of a star. I was able to spot star constellations in the scanning telescope if they were very bright and and well known, such as Cetus and Orion, stars of this nature. I was not able to proceed other constellations. That's about the only comments I have at this time. Over.

CAP Okay, fine. Thank you very much.

SC We are going to do - Houston - future maneuvers for P23 in a lower - slower mode of auto maneuver. Essentially, we are going to load the DAP with 1101 to save fuel.

CAP COM That will be a 11101 DAP mode.

SC Roger. We are going to try to save fuel that way.

CAP COM Good show.

SC With respect to the window, Houston. The windows 1 and 5 have marred haze on them. Satisfactory for visual observation, but possibly not for photography. Windows 2 and 4 are clear. Windows 3 is almost opaque. Over.

CAP COM Okay, thank you.

SC And how does battery B looking to you?

CAP COM Apollo 8. Houston. It looks like it may take another 6 hours on this battery B charge. It turns out that the charge rate is less than what we are getting on our ground current, but it is still above the Apollo 7 curves and it looks like it is going along now in good shape. And I would like to have verification that the timeline leading up to the midcourse correction was satisfactory from your point of view.

SC Roger. Seemed quite satisfactory.

CAP COM Okay, thank you. And we will stay off the loop until you give us a call.

SC Roger. You don't bother us, but our replies make a lot of noise.

CAP COM Okay.

PAO This is Apollo Control. During that rather lengthy series of conversations with the spacecraft we heard Commander Frank Borman request permission from the ground to take a Seconal tablet, that is a short acting

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 133600, CST 8:27p 61/3

PAO sleeping pill. Frank was scheduled to begin his sleep period at about 11 hours GET or about 12 hours - or rather of about 2 hours 45 minutes ago. We also during that pass heard a number of sequences of number passed up to the spacecraft. This is part of the block data updates that are routinely sent up at specified periods in the flight plan. So that the crew always has onboard data that they can use in the computer to reenter or return to earth should it be necessary for any reason and assuming that they do not have any communications with the ground. At the present time Apollo 8 is at an altitude of about 64,600 nautical miles. The speed on the spacecraft is continuing to decrease more slowly now as we move farther from the earth. That velocity at present time is reading 7,236 feet per second. At 13 hours 44 minutes into the flight this is Apollo Control.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 141428, CST 9:05p, 62/1

PAO This is Apollo Control, Houston at 14 hours 14 minutes 28 seconds now into the flight of Apollo 8. Here in Mission Control Center we've just had a change of shift briefing. The Black team is now aboard. The black team with Flight Director Glynn Lunney now relieving Milton Windler and his maroon crew. At the present time Mr. Lunney is going around the room talking to his flight controllers who have been briefed for the past 40 plus minutes by the earlier team, talking over the situation which is very nominal at the present time. We've had no conversation with the crew whatsoever since the last report. However, this is consistent with their desires as they're going into a quiet period of flight at the present time. Apollo 8 continuing very well on its trajectory course. We copied from our displays an altitude of 66 705 nautical miles velocity continuing to slow down. Our current reading of 7101 feet per second in velocity. This is Apollo Control at 14 hours 15 minutes 46 seconds now into the flight of Apollo 8.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 143607, CST 9:27p, 63/1

PAO This is Apollo Control, Houston 14 hours 36 minutes 07 seconds now into the flight of Apollo 8. We're continuing in our quiet mode with the crew. There has been no conversation since our last report - no conversation. Things are settled and quietly paced in the Mission Control Center at the present time with Glynn Lunney discussing various aspects of the mission that has preceded this shift with his various flight controllers. One thing that has been truly remarkable has been the communication thus far in the mission. Our prime acquisition site at the present is a wing site at Honeysuckle, Australia. This is being located at Tidbinbilla, Australia, but a comment or two has been made in the control center that the communications have, in fact, even surpassed those we found in simulations with the crew in the Apollo mission simulator at the Cape. We repeat at this time we've had no further contact with the crew. The Apollo 8 spacecraft at the present time in excess of 68 000 nautical miles in altitude, velocity continuing to decrease. We currently read about 7000 feet per second. At 14 hours 37 minutes 44 seconds into the flight of Apollo 8, this is Apollo Control, Houston.

END OF TAPE.

PAO This is Apollo Control Houston at 15 hours 33 minutes 22 seconds into the flight of Apollo 8. The Apollo 8 spacecraft, at the present time, is 72 032.7 nautical miles in altitude. Our current velocity reading on Apollo 8 is 6764 feet per second, continuing to slow down. During this status time since our last conversation, we've had a brief contact with the crew, with Bill Anders, and we'll play that for you now.

SC Houston, Apollo 8.

CAP COM Apollo 8, you called?

SC Roger. readout temp on fuel cell 2 would be about 90 degrees and on 1 and 3, it would be slightly more - maybe 75 or 80 degrees. But, an hour ago, about fuel cells performance, it looks like 1 and 2 are lower performance than 3. Over.

CAP COM All right. We show the same numbers on outlet temperatures and we've got the sensor for you. We've been watching the thing and we'll keep you advised of anything we see.

SC Okay.

CAP COM And on the performance, you're right - they are not quite the same, 1 and 2 are a little bit lower but all of these are sitting within the ballpark.

SC Roger. Fuel Cell 1 has shown slightly a proportionately higher H2 flow and O2 flow all day long.

CAP COM Okay.

SC I'm showing .062 H2 and .8 O2.

CAP COM All right, Bill. We'll take some cal curves on those.

SC Okay. These things look weak and we'll keep looking at them. However, readout shows about .43 as opposed to your .48 on the oxygen and we'll keep an eye on the cal curves and just sort of watch it for you.

SC Okay, thank you.

CAP COM If you'd like to set up some kind of a COM check time or specified time like every 30 minutes or so on these quiet periods, that would be okay with us. Might help to let us know that we're still in business.

SC All right. Just give me a call every now and then.

CAP COM Okay.

PAO This is Apollo Control Houston and that's our conversation concluded. Our capsule communicator on that during that discussion, by the way, was Ken Mattingly. Ken is due to be relieved shortly. His relief, Jerry Carr, is now aboard. As you can tell, they were cross-checking, both from the spacecraft and the ground, various systems readings. We look very good, at this time, as we continue with a relatively calm and quiet period in this, the Apollo 8 mission at 15 hours 34 minutes 54 seconds into the flight of Apollo 8. This is Apollo Control Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 160140 CST 10:52p, 65/1

PAO This is Apollo Control, Houston 16 hours 01 minute 04 seconds into the flight of Apollo 8. The Apollo 8 spacecraft at this time 73 818.6 nautical miles in altitude our current velocity reading 6659.5 feet per second. Bill Anders and Jim Lovell should be finishing up on an eat period very shortly here, while spacecraft commander, Frank Borman, still in his sleep period, has about 2 hours to go. About 30 minutes from this time, the Apollo 8 crew is scheduled for a guidance and navigation platform alignment, with that coming at approximately 16 hours 30 minutes into the flight. We've had no further contact with the crew and at 16 hours 02 minutes 10 seconds we will continue to monitor and this is Apollo Control Center, Houston.

END OF TAPE.

PAO This is Apollo Control Houston. 16 hours 20 minutes 25 seconds now into the flight of Apollo 8. The Apollo 8 spacecraft, at this time, 75 thousand 34.9 nautical miles in altitude. Velocity reading on our display is 65 hundred to 88.7 feet per second. We've had a brief contact with Jim Lovell aboard the Apollo 8 spacecraft. This we will pass along to you now.

CAP COM Apollo 8. Houston.

SC Go ahead Houston. Apollo 8 here.

CAP COM Okay, Jim. Got an update here to the flight plan. You got that 16 55 star visibility check and what we have got on that looks like Navi is still our star. And the numbers associated with that are roll 102.6, pitch 328.9, yaw 346.3. That gives you a shaft and trunion of zero. And if you think you can - if you think you can do something with this, why we would like to go ahead and give it a try and see if we can verify it or maybe learn something if we try it. If you can't do it with Navi.

SC Roger. Stand by one. Houston. Apollo 8. Over.

CAP COM Apollo 8. Houston. Go.

SC Roger, we will maneuver at this present time and try to pick up that attitude and get Navi, although I think it's a waste of time, but we will give it a try.

CAP COM Roger. Standing by for results.

PAO This is Apollo Control Houston. 16 hours 22 minutes. That concluded our conversation with Jim Lovell and the Apollo 8 spacecraft. From the ground, by the way, that was Ken Mattingly, our Capsule Communicator. They have just exchanged head sets only moments ago. The discussion dealt with the star visibility sightings that are due to take place in ground elapsed time of 16 hours 55 minutes. Some 30 minutes from this time. So at 16 hours 23 minutes 8 seconds into the flight of Apollo 8, continuing on its precise course, very nominal, very good, this is Apollo Control Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/21/68, GET 164832, CST 11:41
67/1

PAO This is Apollo Control Houston, 16 hours
48 minutes and 32 seconds now into the flight Apollo 8. The
Apollo 8 spacecraft at this time 76 800 nautical miles in
altitude; our velocity now down to 6489.6 feet per second.
We've had a brief conversation with the Apollo 8 crew and
we'll play that for you now.

SC Houston, Apollo 8.

CAP COM Apollo 8, Houston. Go.

SC Roger, we're out at attitude right now
and looking through the scanning telescope. I can barely
see three stars at all and every time that the thruster will
fire, you know, just completely blanks out my vision.

CAP COM Roger, understand.

SC Now, the attitude is good, Houston as
far as not having glare on the optics and it might be
a certain amount of Data adaptation required here.

CAP COM 8 Houston. Roger, copy.

PAO That was command module pilot Jim Lovell
who had - was describing results of his star visibility
exercise. At 16 hours 50 minutes into the flight, still
looking good, this is Apollo Control Houston.

END OF TAPE

. PAO This is Apollo Control Houston. 17 hours 19 minutes 58 seconds now into the flight of the Apollo 8. Apollo 8 now at an altitude of 78,339.1 nautical miles. 78,339.1 nautical miles away from the earth. Its velocity at this time around 6383 feet per second. We've had a conversation with Jim Lovell aboard the spacecraft and we will play that now.

CAP COM Apollo 8. Houston.
 Apollo 8. Houston. Over.
 Honeysuckle Houston com tech Honeysuckle ...
 CAP COM Apollo 8. Houston. Over.
 GODDARD Houston. Goddard voice. Negative twin dark keys.
 CAP COM Apollo 8. Houston. Over.
 SC Go ahead Houston. Apollo 8 here.
 CAP COM Apollo 8, this is Houston. We have got a new PPC attitude for you when you finish P23. Give you a better look at the earth. Over.
 SC Roger. Ready to copy.
 CAP COM Okay, pitch 224 yaw 20
 SC New PPC is pitch 224 yaw 20.
 CAP COM We confirm.
 SC Houston. Apollo 8.
 CAP COM Apollo 8. Houston. Go.
 HONEYSUCKLE Houston. com tech Honeysuckle negative

...
 Roger.
 CAP COM Apollo 8. This is Houston. Over.
 Apollo 8, Apollo 8. Houston. Over.
 Apollo 8, Apollo 8. Houston. Go ahead.
 SC Roger. We are taking our time going to this new P23 attitude, going to Navi is quite a ways away from the attitude we need for P23. I have a correction to make on Navi after getting dark adapted you can pick out Cassiopeia and you can pick out Navi itself. It is difficult to see what stars are around. We are still - have quite a bit of particles that are floating with the spacecraft. Especially when we move the optics and shaft. It seems to throw off a lot of particles.

CAP COM Roger. We copied that. What's your spacecraft lighting situation inside now?

SC We have the center window the round window covered and we have the other windows are opened.

CAP COM Roger. We copy.

PAO ... barbecue mode - slow roll that the spacecraft undergoes to give even sun distribution to the

APOLLO 8 MISSION COMMENTARY, 12/22/68, GET 172000, CST 12:11a 68/2

PAO skin of the spacecraft. Also you heard a description from Jim Lovell on his efforts in the star sighting area. Otherwise, very quiet, it's the only conversation we have had in the past 20 minutes or so. At 17 hours 23 minutes 54 seconds, this is Apollo Control Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/22/68, GET 173645, CST 1227a 69/1

PAO Apollo Control Houston. 17 hours 36 minutes 45 seconds now into the flight of Apollo 8. The Apollo 8 spacecraft is now at an altitude of 79 761 nautical miles, velocity at the present time is 6329 feet per second. We've just had another conversation with Jim Lovell and we'll pass that along now.

CAP COM Apollo 8, Houston.

SC Go ahead Houston.

CAP COM Apollo 8, Houston. While you're maneuvering for your P-23, we have an update for Delta H for you if your ready to copy.

SC Roger, stand by. Roger, Houston. Say you have a Delta H update for us? Is this what you mean?

CAP COM Roger. Delta horizon update.

SC Roger. Go ahead.

CAP COM Ah, this is as a result of your P-23 calibration, the update follows. Verb 24, Noun zero one enter 1354 enter all balls enter 21450 enter comment continue to mark on the horizon destination that you've used previously, your marks are looking very good.

SC Roger, Delta H update as follows. Verb 24 noun zero one enter 1354 enter all zeros enter 21450 enter. Understand those are two ought zero numbers.

CAP COM That's affirmative ...

SC Roger. When do we get the maneuvers here ... quad 23 and I'll put these in then I'll ...

CAP COM Okay. Apollo 8, Houston. There's no requirement for you to leave P-23, you can enter those right now if you want to.

SC Roger.

PAO Apollo Control Houston. That concluded the conversation. We did observe on our displays that Jim Lovell did punch in his Delta Horizon update and at last report was proceeding with his program 23 ... navigation. Incidentally our current weight of the spacecraft in flight now reads 63 045 pounds. At 17 hours 39 minutes 50 seconds into the flight, this is Apollo Control Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/22/68, GET 180305 CST 12:54 70/1

PAO This is Apollo Control, 18 hours, 3 minutes, 5 seconds now in the flight of Apollo 8. Apollo 8 at the present time 81, 348 nautical miles in altitude, current velocity reading will be our displays, 6200 47.4 feet per second. We've had a brief conversation with Jim Lovell which we'll play now.

SC Houston, we're in low bit rate now.

PAO Apollo 8, Houston, you're in high bit rate.

SC Roger. We'd like to record on this P-23 stuff.

CAPCOM Okay.

SC How about commanding low bit rate with record forward.

CAPCOM Roger. Low bit rate, record forward.

SC All right, Houston, have you said those commands yet?

CAPCOM Apollo 8, Houston, they have been sent.

SC All right, Roger. Thank you. I am on the other side, too lazy to go over and get it.

CAPCOM Apollo 8, Houston. We'd like to go back to high bit rate in order to get this P-23 data recorded. Over.

CAPCOM All right, checklist, Houston, there is low bit rate, Houston. If you want high, you can get it.

CAPCOM Roger. We're going high bit rate.

PAO We have a correction. That gentlemen onboard the spacecraft was not Jim Lovell. That was in fact Bill Anders, the lunar module pilot. We're at the time in the flight plan now when Frank Borman should be awake shortly. However, this will probably turn out to be a crew option. At the present time, Jim Lovell - is still performing certain aspects of cislunar navigation program. That's program 23. So at 18 hours, 5 minutes, 2 seconds into the flight of Apollo 8, this is Apollo Control Houston.

END OF TAPE

A/8, Mission Commentary, 12/22/68, 1:17 a.m., 18:25:45, 71/1

PAO This is Apollo Control Houston, 18 hours 25 minutes, and 45 seconds now into the flight Apollo 8. We've had additional conversations with the Apollo 8 crew and we'll pass those along now.

CAP COM Apollo 8. Houston.

SC Clear Houston

CAP COM Apollo 8 Houston. Do you want us to turn off your DSE for you? It's probably about half full or getting high bit rate now.

SC Do you want to get the rest of this data?

CAP COM We're getting good high bit rate now.

SC Roger go ahead.

CAP COM OK and also we're, your state vector is now based on about 5 hours of tracking. We have you on a pericynthian of 69.7 miles with a free return. Your entry flight path angle looks like about minus 14. You will need a few feet per second to get you back on a nominal entry angle.

CAP COM Apollo 8 Houston. Did you get the words on the state vector?

SC Houston did you read Apollo 8, we got a lot of noise.

CAP COM Apollo 8 Houston go ahead. Apollo 8 Houston go. Apollo 8 Houston reading you fairly weak. Repeat the state vector information. Your state vector is now based on 5 hours, more than 5 hours of tracking. We show you on a pericynthian of 69.7 miles with a free return with entry path flight angle of minus 14 degrees. Will only need a few feet per second at the lunar distance to get you back on a nominal entry angle. Over.

CAP COM Roger.

PAO This is Apollo control. We've had no definite indication yet from the crew as to change of shift on there sleep wake cycle. However we suspect that at this point in time command module pilot Jim Lovell and lunar module pilot Bill Anders are just about ready for their sleep period. They were awakened at the cape this morning at 2:36 eastern standard time. Its been a long day. Its been a day that so far has carried them to an altitude of 82 thousand 867 nautical miles. Our velocity reading at this time 61 hundred 69.7 feet per second. At 18 hours 29 minutes 5 seconds into the flight. This is Apollo Control Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/22/68, GET 185300, CST 1:50 72/1

PAO This is Apollo Control, Houston,
18 hours, 53 minutes and now into the flight. During the
past several minutes we've had conversations with - the
Apollo 8 crew. They have just shifted their sleep wake
cycle. And we'll pass on those conversations at this time.

CAPCOM Apollo 8, Houston, GO.

SC Roger. The PTC maneuver now. Like a
distance status how the battery looks and how the fuel cells
look and et cetera. Over.

CAPCOM Roger.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/22/68, GET 185430, CST 151a 73/1

CAP COM Apollo 8, this is Houston. We figure your battery B will be charged in about two to three hours. All your systems look GO, your RCS usage so far is about 60 pounds, six zero pounds over nominal. Over.

SC Roger. How about fuel cell two. is that looking alright now?

CAP COM Roger. Fuel cells are all looking good.

SC Okay, ... systems should behave now ... minding the store so you might have everybody keep an extra sharp eye on ...

CAP COM Roger, Bill, you think you're going to be able to sleep okay?

SC Yeah, I think we kinda warmed up to a good sleep here by now. Houston, Apollo 8.

CAP COM Go ahead.

SC Onboard navigation indicates a ... altitude of 38.4 miles.

CAP COM Understand, 38.4 miles.

SC That's (too faint)

CAP COM Roger, copy. Apollo 8, Houston.

SC Go ahead, Houston.

CAP COM Apollo 8, Houston be advised here down-link now is getting very noisy. Apollo 8, this is Houston with some comments on navigation.

SC Go ahead Houston.

CAP COM Apollo 8, this is Houston. We're wondering about your GDC backup align, we'd like your opinion on the possibility of doing this align using Sirius and Rigel rather than Navi as its in the north set at this time. Over.

SC Stand by one.

CAP COM Roger.

SC Houston, this is Apollo 8. We concur. Sirius and Rigel would be two stars that would be much better than Navi and Polaris, however, I did ... after I became adapted but I'm afraid that the time required to do that type of alignment would be extensive if we had to go to that alignment.

CAP COM Roger, Jim, we understand. We'll go ahead and work in that direction and we'll quit bothering you. Good night. Apollo 8, this is Houston.

SC Go ahead, Houston, this is Apollo 8.

CAP COM Apollo 8, Houston, at 19 GET we're due for another cycle two on the cryo fans. Over.

SC Roger.

CAP COM Roger, give us a call when your complete.

PAO This is Apollo Control. We've just played out the conversation and it turned out this is one of those rare occasions, at least this time of the morning, over.

APOLLO 8 MISSION COMMENTARY,12/22/68,GET 185430,CST 151a 73/2

PAO a brief span of time where conversation took place with all three crew members. No doubt Jim Lovell and Bill Anders are in the early phases of their sleep period. At the present time, Apollo 8 84 593.7 nautical miles in altitude, velocity reading sixty, ah correction six zero eight four that's 6084 feet per second and decelerating. At 18 hours 58 minutes and 30 seconds into the flight of Apollo 8, this is Apollo Control Houston.

END OF TAPE